The role of the sympathetic nervous system in sexual orientation

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Abstract

Differences between homosexual and heterosexual response extend beyond the anatomy of the involved partners and include sexual arousal distribution, motor patterns, sex positions, emotional triggers etc. A closer look at what is different and why reveals a probable role for the sympathetic nervous system (SNS) in sexual orientation, with both over- and underactivation of the SNS potentially leading to homosexuality.

Key words: penetration, erection, sexual orientation, attractions, sympathetic.

Introduction

Homosexuality has been consistently associated with increased risk of mental health disorders like anxiety disorders, depression, substance use disorders etc. Studies suggest that minority stress is not the only contributing factor to the observed risk and that increased psychopathology also precedes homosexuality.[1,2] A common link between homosexuality and mental health disorders may be imbalances in the SNS.

Methods

Scientific literature was used for statistical data and Reddit forums were used as source for self-reports on sexual experiences. Statistical facts and self-reports were combined to give a deeper insight into each topic. The focus of the paper is mainly on men due to more extensive data.

The typical heterosexual response

The heterosexual response typically involves sexual drive (subjective sexual arousal, desire), objective sexual arousal, erection, penetration, thrusting, and orgasm. Let's describe each of them.

Sexual arousal

Sexual arousal consists of subjective and objective arousal. The subjective arousal corresponds to sexual drive (or desire), the motivation to consume the sexual act. Desire can be directed toward persons and called attraction, or can be void of attractions, directed toward the act.

Objective sexual arousal consists in systemic changes like increased heart rate, blood pressure, hyperventilation [3] etc., and in local changes, like increased sensitivity to touch, increased blood flow, raised skin temperature (feeling of warmth), increased muscle tone, release of lubricants etc.

Erection of the penis shaft/vulva

During sexual arousal, blood flow increases the most in the penis and vulva, which have erectile tissue, causing them to become erect. Part of the erectile tissues in women are the clitoris and the vestibular bulbs. [4] Sexual erection can be psychogenic or reflexogenic. Psychogenic erection is elicited by visual or auditory cues. It is usually short-lived, weak and is regulated by the SNS. [5] Reflexogenic erection happens when the genitals are touched and is mediated by the parasympathetic system.

Erection intensifies local arousal and makes penetration possible by changing the shape and the hardness of the penis. Arousal and erection cause the vagina to balloon allowing room for penetration. Expansion of the vagina stimulates contraction of the bulbocavernosus and ischiocavernosus muscles [6] surrounding the vestibular bulbs at the entrance of the vagina (as well as the clitoris), which further increases erection. [7]

There are 5 recognized phases in erectile response: latent, tumescent, full erection, rigid erection, and detumescent. [8]

Continuous, involuntary contraction (hypertonia) of the ischiocavernosus and bulbocavernosus muscles surrounding the penis intensifies erection and makes the penis rigid, hard enough to allow penetration. [9, 10, 11]

Erection of the glans

The penile/clitoral glans also gets filled with blood during sexual arousal. The penile glans is at the head of the penis and is rich in genital corpuscles, which sense touch and pressure. It is innervated by a branch of the dorsal penile nerve. The other branch of the penile nerve terminates in and on the shaft of the penis and is primarily motor, probably associated with erection and detumescence. [12]

It has been suggested that while erection probably stimulates the genital corpuscles in the glans, the corpuscles also have a role in maintaining erection during penetration. [13] Touching the glans in women triggers the clitoro-vaginal reflex: the contraction of the vaginal walls, which is thought to further stimulate penis erection, [14, 15] and in men, the bulbocavernosus reflex: the contraction of the bulbocavernosus muscle and the anal sphincter. Contraction of the bulbocavernosus muscle stimulates penis and glans erection.

Penetration and thrusting

Following positioning and successful insertion of the penis, the penis is rubbed and pressed against the vulva and vagina in an in and out motion. The genital corpuscles get stimulated and further increase erection and skin sensitivity.

Following penetration, the male thrusts his pelvis. The motor movements and the rhythm[16] of the stimulation contribute to euphoria in the male probably by increasing dopamine. Less frequently, it is the woman who thrusts the pelvis, although in a less rhythmic and vigorous style than the man.

Orgasm

Orgasm is the culmination of sexual arousal, and involves contractions of the bulbocavernosus and ischiocavernosus muscles, ejaculation of the sperm in the male, and an end to the sexual arousal. Orgasm is rewarding and reinforces the sexual response.

The typical homosexual response

While heterosexual men typically engage in a penetrative role in sex, with only 3% having ever been penetrated [17], gay men regularly engage in non-penetrative sex or engage in sex as the penetrated partner. Early experiences of gay adolescents typically involve masturbation and oral sex. As they grow, they engage in penetrative sex. Depending on the position taken during penetration, gays identify as “bottom” (receptive) when they prefer to be penetrated, “versatile” when they practice both penetration and being penetrated, “top” (insertive) when they prefer to penetrate. A very small minority neither penetrates nor is penetrated and is called “side”. Large surveys have found that 17 % - 24% of men who have sex with men identify as tops. [18,19] The majority identify as bottom or versatile.

Bottom and versatile identities are associated with being identified as gay, while top and versatile identities are associated with being identified as bisexual. [20] Tops prefer the feminized male face, bottoms prefer the masculinized male face, and versatiles do not have a preference. [21] Bottoms are less masculine and have lower satisfaction with their penis size. [22, 23]

The above suggest that bottoms have a more core gay identity because they do not have sex with women and prefer masculinized partners.

Preferences for being a top or bottom can change over time. Gay bottoms among reasons for bottoming self-report erectile difficulties and performance anxiety. In versatiles, bottom/top preference can vary according to masculinity of the partner: topping with a less masculine partner and bottoming with a more masculine partner. [24, 25]

Gay sides, tops self-report fantasies of being bottoms, but unsatisfactory experiences with bottoming which keep them away from the experience.

Since bottoming is associated with less masculine features and seems to be associated with younger age, it looks plausible that gay men who have come out during early adolescence start as side or bottom, but as their testosterone levels increase, become tops. Testosterone masculinizes the brain circuits responsible for regulating mounting and thrusting.

As for lesbians, the distinctions are vaguer, probably because female sexual arousal is less restricted to the genitals. Nevertheless, among lesbians also is common having no penetration desire or having preferences similar to the opposite sex. They self-report: "…every time I top, I feel an undeniable urge to be inside/thrust inside my own partner as if I can somehow do it naturally with my own body (I'm a cis woman)", or: "Focusing my attention on my clit and imagining it's f%$king my partner…is a surefire way to make me come."

Arousal distribution and orgasm in the penetrated versus penetrating role

The areas of the pelvis being stimulated and aroused to orgasm differ depending on whether the person is penetrated or penetrates.

Penetrating men have penile orgasms, penetrated men have prostate or anal orgasms. There may also be mixed orgasms. Penetrated women have typically clitoral or vaginal, mixed orgasms, while women penetrating (with toys mainly) have clitoral orgasms.

Interestingly, orgasms feel similar depending on whether they are achieved by penetrating or being penetrated.

Clitoral orgasms are rated as sharp, electrical, easier, and more controllable, more localized, short-lasting and superficial. Vaginal orgasms are felt as throbbing, more diffuse, longer-lasting, deep, stronger. [26] Which part of the female genitals is exactly responsible for the vaginal orgasm is not entirely clear, but some researchers think that the vestibular bulbs and the bulbocavernosus muscle surrounding them are the center of the response [27], while others think that the anterior vaginal wall is also important.

Penile orgasms are described as sharp, short, while prostate and anal (penetrated) orgasms are felt as deeper, wider, more intensive. Prostate and anal orgasms have a smaller or no refractory period similar to vaginal orgasms. They are much more difficult to achieve and may happen without ejaculation or erection.

In each type of orgasm different nerves are stimulated. The penetrating orgasms involve activation of the penile/clitoral branch of the nerve. Penetrated orgasms involve activation of the perineal branch of the pudendal nerve and the hypogastric nerve.

The superficial external anal sphincter and the bulbocavernosus muscle have neuromuscular continuity in most people and are innervated by the perineal branch of the pudendal nerve. [28] Therefore the bulbocavernosus muscle is involved in all three orgasm types. The ischiocavernosus muscle seems to be involved only in the penetrating orgasms, when the penis/clitoris is rigid.

Bottom gays report feeling sexual arousal around their anus as tingly, warm, twitchy, itchy, throbbing, with a desire coming from the anus. The anus area does not have genital corpuscles and erectile tissue, but it is associated with the pleasure of defecation. Penetration of the anus is probably mistaken as defecation and evokes pleasure. It also evokes pain, which if moderate can intensify the pleasure. Building on this and the proximity to the penis, the area can experience orgasm at first as an accident of stimulation but following several orgasms as a learned response.

Some gay men self-report training themselves to reach the prostate or anal orgasm by intentionally stimulating the penis, stopping, stimulating the anus, contracting the pelvic muscles until prostate or anal orgasm is reached. Some bottom gays stop stimulating the penis and treat it as a redundant part of the sexual experience once they start to regularly experience anal orgasm. This suggests that in total bottoms perineal and rectal branches of the pudendal nerve take over the function of the penile branch.

Erection, penis sensitivity and orgasm threshold

Typically, the erect penis and the vulva are the areas with the strongest sensitivity where orgasm happens. But local arousal can be decoupled from erection. The penis can be erect but numb, or it can be sensitive while flaccid, because erection and sexual arousal are regulated by different nerves. When the penis is insensitive, sexual arousal can shift to the adjacent or more distal areas of the body. [29]

Normally, weak penile arousal should lead to negative feedback and the end of the sexual response, but if there is low orgasm threshold orgasm can be achieved even with a soft or flaccid penis.

Penetrated orgasms in men, although possibly intense, are not as satisfactory as penile orgasms. Gay bottoms have a reputation for being insatiable. This leads to increased sexual activity, which may further weaken erection. I would speculate that regular anal stimulation could lead to overstimulation of the hypogastric nerve and perineal, rectal branches of the pudendal nerve, desensitizing them and further decreasing the contribution of the pelvic area to the overall sexual arousal.

The penetration urge and the thrusting urge

The penetration urge

Sexual sensation in the vaginal bulbs and inferior vagina in women is supplied by the deep perineal branch of the pudendal nerve and is felt as inside the body. Therefore, when women get genitally aroused, they feel the rubbing urge (sensation of sexual arousal around the vagina) as internal. The increase in tone of the bulbocavernosus and ischiocavernosus muscles that surround the entry of the vagina is probably felt as a grasping urge. The woman feels an urge to grasp something and to be rubbed with it, that is, to be penetrated.

Heterosexual men on the other hand experience penile arousal as external. The rubbing urge is felt external to the body and in the direction of the penis. The increased tone of the

bulbocavernosus and ischiocavernosus muscles and with the rubbing feeling are probably subconsciously felt as an urge to penetrate.

The above suggests that the magnitude of the urge to be penetrated or to penetrate depends on the sensitivity of the penis/vestibular bulbs and the tone of the bulbocavernosus and ischiocavernosus muscles surrounding the penis and the vulva. The rubbing sensation is intensified by blood flow (erection), which is intensified by the increased muscle tone.

Thus, the magnitude of the urge of men to penetrate and of women to be vaginally penetrated probably **depends on the intensity of erection, sensation in the genitals and muscle tone around the genitals**.

In women, an overconcentration of the arousal in the clitoris, with little sensation around and in the vagina, would make the woman want to penetrate instead of being penetrated.

The penetrated urge in gay men is probably a cognitive effect of the increased muscle tension around the anus combined with the warmth, itchy feelings of sexual arousal. The ischiocavernosus muscles, which contract for penis rigidity, are probably relaxed during receptive anal sex.

The penetrated urge is described as follows by a gay bottom: “When I get horny now there is still a little twinge in my cock but also a twitchy, anxious, craving feeling in my ass. Sometimes that desire is so strong that I’d rather be fu#$ed than uncaged,” or another gay bottom: “When random thoughts of sex enter my mind…I suddenly become very aware of my anus, rectum, and colon,… the awareness can quickly become a craving and result in involuntary muscle contractions.”

During puberty, the first sexual experiences usually do not involve penetrative sex. The penetration urges probably do not develop until sexual arousal concentration around the genitals is sufficient to evoke increased muscle tone that affects the brain circuits regulating motivation.

The thrusting urge

The penetration urge can be active or passive, with the resultant combinations being: penetrating/active, penetrating/passive, penetrated/active, penetrated/passive. The active or passive quality is determined by the motivation to be mostly immobile, not thrusting (pursued, “submissive”), or to perform thrusting (pursuing, “dominating”).

Active penetration itself causes a probably dopamine mediated euphoria due to the rhythmic motor movements of the pelvis. The euphoria increases arousal and strengthens erection. Inability to move also can cause arousal, probably serotonin mediated. Serotonin mediates freezing or escaping reactions to threatening stimuli. The passive partner gets aroused by the passivity, while the thrusting partner gets aroused by the action.

The active penetration urge in men is probably conditional upon sexual arousal concentration in the penis, because men who instead stimulate their anus area self-report feeling

pursued/submissive. In women, disproportionate arousal located in the clitoris, like it happens in women with bottom growth, would stimulate active penetrating urges.

A woman who does active thrusting with her vagina in the Amazon sex position or with her clitoris in pegging would psychologically feel as if thrusting with a penis. Female to male transgender persons self-report feeling euphoric when actively penetrating.

Gay bottoms self-report on the penetration role in their first sexual fantasies:

> I knew I was a total bottom well before my first sexual experience. The first time I watched (straight) porn, I knew I wanted to be the one getting fu%$ed… Topping the performer never even registered as a possibility or even an option, and the idea simply did nothing for me… I was 12 at the time;
>
> or:
>
> From the moment I first thought I was gay, I thought I was a bottom - and this was in my early teens. I just know that I wanted to be (lovingly) overpowered by a bigger and stronger boy than myself.

Loss or reversion of penetration urges is followed by or happens in step with a shift in sexual attractions

Men who have sex with men self-report changes in penetration preferences followed by changes in sexual attractions.

Heterosexual autogynephilic (sissy) men that practice anal sex and decondition penile erection gradually start having homosexual fantasies and enter gay relationships. Upon stopping porn use, they self-report of gradually losing interest in autogynephilic fantasies and in gay relationships.

An autogynephilic man describes as follows the change in penetration urges that his sissy porn use caused:

> I no longer experienced a sexual drive centered around penetration, but instead the sexual drive was kind of diffused throughout the rest of my body, so that just even playfully touching a friend or a lover was a more interesting sexual exchange than penetration. And I also think I became slightly more attracted to men than I previously was.

Heterosexual men who practice pegging also report a change in sexual attractions. They may or may not be autogynephilic.

They report: "…my ex-wife would peg me on a regular basis. What it did was create an urge to try the real thing. Tried the real thing and have never looked back…," or: "My interest in the real thing has definitely come from pegging and porn."

To the question "Have you ever been pegged by a woman?", men in a gay forum respond with answers: "Many times and now I am looking for the real thing [a man]. I need to be filled and can't stop thinking about I;" or: "Yes, many times. My wife has pegged me a lot. I love it but it doesn't beat a real man. Much rather have a man…;" or:

> I was seeing a much older lady…We discussed… pegging. We were both very keen to try it and when we did I have to say I was a little underwhelmed. Just didn't feel right but it did spark this interest in me to try the real thing and a few months later I did…In my experience can't beat real d$%k.

A century ago, a physician described the transformation of his fantasies under the effect of cocaine:

> During this repeated imaginary coitus I …had a sensation of voluptuous [erectile] pleasure in the loins and penis. The feelings of voluptuousness [erection] became weaker and weaker, and the images followed each other more quickly than at the beginning… from then on I was able to see myself as a woman. I would see myself… having intercourse with several men at the same time, and I dreamed of nothing but sodomy, masochism and sadism. [30]

Everything happened in the imagination. As psychogenic erection weakened but sexual drive continued, the imagination was transformed.

A similar experience, at a very young age, without the use of porn or stimulants:

> I've been watching porn since I was 11, but I've had sexual fantasies about both genders way before that. I would imagine having sex with a woman almost all the time. Then after some time, that turned me off, and the idea of sex with a man started to turn me on almost like when I first started fantasizing about women.

Self-report on first gay childhood fantasies at around age 12-13:

> Remember masturbating to my crush at the time… And again, the more I did it, the more limp and desensitized that my penis became. Then one day, again, no idea where the thought of it came from, but for some reason, the idea of gay sex had turned me on beyond belief...

Given the young age of the boy, his erectile capacity lacked behind his mental drive. Following the erectile difficulties, which probably lead to no penetrating urges, the gay fantasies emerged.

Another interesting case narrated in detail is of a heterosexual man who got curious as to how anal orgasm felt and ended up becoming gay bottom after several months of regular anal stimulation. He notes:

> One of the first things I noticed about being penetrated…, even with just a dildo, is how unmanly it made me feel. Even without a specific fantasy, I just felt somehow submissive, and it felt so freeing, as if I was no longer responsible for anything. The more I kept that dildo moving…, and the more I focused on the idea that I was being f@#$ed, the better that sense of submission and freedom from responsibility felt. My mind just naturally created scenarios in which I was submitting to a man, being dominated by him.

Other interesting self-reports are of a lesbian who loved being penetrated by her MtF girlfriend who had not done sex reassignment surgery, and was entertaining the idea of getting a boyfriend to experience the joy of being penetrated.

The penetration urge could also change due to sex reassignment surgery. Sexual orientation has been found to change in some transgender persons after surgery [31, 32] although hormone therapy is a confounding factor in this case.

The above suggest that changes in the penetration urges lead to changes in sexual attractions.

Self-reports suggest that sexual attractions expressed in fantasies are much more fluid than attraction to an intimate partner. Bisexuals who bi cycle during a relationship self-report of still being attracted to their partner, but less or more attracted depending on the phase of the bi cycle they are in.

Heterosexual men who are pegged by their female partners can continue the activity for years without having same sex attractions.

Single men, including boys during early adolescence, would be much more vulnerable to the effect of the penetration urge on their sexual orientation.

The role of the SNS in sexual orientation

The systemic changes associated with sexual arousal like increased heart rate, blood pressure, breathing rate, sweating etc. consist in the activation of the SNS. Dopamine, norepinephrine, epinephrine are the main neurohormones that signal in this system.

Activation of the SNS causes a slight increase in genital blood volume. [33,34] Moderate increases in its activity are associated with higher genital arousal, while very low or very high SNS activation is associated with lower genital arousal. [35] Imbalances in the SNS weaken erection [36, 37], and lower the threshold for orgasm [38]. Imbalances in dopamine signaling in the SNS increase sexual drive. [39]

SNS mediates psychogenic erection and arousal. It is predominant during the first phase of the sexual response, when the person is longing for, fantasizing, pursuing a sex partner, until first

genital contact happens, when the parasympathetic system which mediates reflex erection takes over. SNS becomes predominant again at orgasm.

Overactive SNS

An overactive SNS manifests in excessive drive, mediated by the dopamine-serotonin system. Dopamine mediates wanting, serotonin mediates satiety. Dopamine agonists cause same sex behavior in laboratory animals. [40]

Cocaine and methamphetamine are among the dopamine agonists consumed for recreational purposes. At first, they strongly increase sexual activity and satisfaction, but under prolonged use they cause erectile dysfunction without affecting sexual drive. This would lead to the abolishment or reversion of the penetration urge.

Research shows that methamphetamine is associated with unprotected receptive anal sex (odds ratio, 2.03). [41] Meth users self-report reverting to gay sex within several days of bingeing on meth, or even intentionally consuming it so as to be bottoms. In the urban dictionary the word meth fag conveys this link between methamphetamine and homosexuality.

Other conditions associated with increased SNS activation and increased homosexuality rates are depression, anxiety disorders. Gay versatiles and bottoms report higher levels of childhood anxiety than gay tops and heterosexuals. [42]

Low serotonin may be the main mechanism through which anxiety and depression affect sexual behavior. Low serotonin levels have been associated with same sex attractions in laboratory animals [43],[44] Serotonin affects erection [45],[46] skin sensitivity and the ejaculatory (orgasm) threshold. [47] Persons with Post SSRI Sexual Dysfunction, report having genital numbness, weak orgasm after taking SSRI drugs which affect the serotonin system. Numbness would weaken the penetration urge and low orgasm threshold would allow non-penile orgasm.

A self-report on the effect of depression:

> I begin to have homosexual fantasies when I'm really depressed. During these periods, I have also experimented with anal masturbation…And without fail, once my depression subsides and things are at a more manageable level again, these fantasies disappear completely and I find myself unable to be aroused by anything other than women.

Mixed depression, a kind of depression where the person has both manic and depressive symptoms, could be associated with both high sex drive due to manic symptoms and erectile difficulties due to depressive symptoms.

Masturbation is a practice that is vulnerable to the effects of an imbalanced SNS. Erection during masturbation is a mix between psychogenic erection (elicited by visual, auditory stimuli) and reflexogenic erection. The body area stimulated by physical contact is much smaller than during partnered sex, hence there is less reflexogenic erection, but there is unlimited access to repeated

stimulation. Under repeated stimulation, progressive weakening of erection happens, leading to the abolishment of the penetration urge, which would facilitate shifts in attractions.

Even fantasies alone are vulnerable to the same dynamic. They cause psychogenic erection, sexual arousal that intensifies to a certain peak but not enough to cause orgasm, although, there are rare people who can orgasm by fantasies alone. The peak arousal is rewarding and the fantasies return. If the fantasies accelerate, erection falls behind and the fantasies may further increase in frequency because they are less satisfactory.

Underactive SNS

An underactive SNS could also lead to homosexual attractions, because the sexual response would be little affected by the emotional input, hence potential partners would be selected based on their ability to release sexual tension rather than their physical appearance or personality.

Sexual attractions

The facts suggest that a low ratio of genital arousal to overall arousal is associated with loss or reversion of penetrating urges and is followed by or happens in step with a shift in sexual attractions.

Decreased genital distribution of arousal would make orgasm less satisfactory, although the orgasm may be perceived as more intense. This would facilitate shifts in attractions.

A possible mechanism that would aid in the shift toward same sex attractions is that the increased weight of systemic arousal (mediated by SNS) would probably lead to increased cross-talk of emotions with sexual arousal.

The systemic sexual arousal is experienced as an emotion. Other emotions that activate the SNS cause similar autonomic changes.

The cross-talk could happen for example between envy and sexual attractions. Envy would trigger sexual attractions, or vice-versa, gender envy would appear due to sexual attractions to the opposite gender. The term “jealusty” has been coined for the experience of gay men who feel a mix of “I want to look like that person” and “I want to have sex with that person. [48]”

Lesbians report similar feelings, like:

> I come across these instances quite often where I see a beautiful girl and I think “Ugh I wish my butt looked like that” or I wish I carried my self like that”. And in some instances, not all but a lot of the time, it will be followed by or simultaneously met with attraction. Like I just don’t want to look like her…I also want to have sex with her. I think.

A lot of sexual behaviors commonly practiced by gay men are associated with negative emotions that accompany the fight-or-flight response, like oral sex, semen swallowing – disgust; anal sex –

pain, disgust; BDSM - aggression, fear [49,50]; open relationships, group sex – shame, jealousy; cross-dressing – shame etc.

The intensive emotions increase sexual arousal and are subconsciously or intentionally elicited for such purpose.

The common gay experience of being anally penetrated, in contrast with the female experience of vaginal penetration, is often a source of pain, but as one gay bottom put it: “There is pain, but there is also pleasure. One cannot have the one without the other, and personally it’s what makes it exciting and fun for me.”

As mentioned previously, in the reverse scenario, when there is a high ratio of genital to systemic arousal, emotions would have little weight in determining the course of the sexual response and attachment to emotional cues would be less selective. Sex, physical or personality attributes of the partners would be less important than their ability to bring a release of the sexual tension. Hence, the person would recourse to gay partners in lieu of women and vice versa, toping both. Such an imbalance could happen in persons high in the psychoticism personality trait.

An emotion that could cross-talk with sexual arousal under low systemic arousal could be empathy. Empathy is stronger toward children, family members, friends. Young gays in the gay community commonly refer to older, more masculine gays, who are also potential sexual partners, as daddy. A word that normally represents family ties has been sexualized.

Also, homosexual men are more likely than heterosexual men to choose partners with a big age gap. [51] Older partners’ increased empathy toward significantly younger men probably contributes to increased sexual arousal.

Responses to the question “You realized you were gay at what age?” show how some gay men interpret empathy as sexual arousal since a very young age:

> I was three or four but at that age the feelings you have are so innocent and immature that it’s more like feeling close affection toward another boy than anything else…I really just liked this one boy, more than I liked any of my other boyfriends at the time…And on second or third grade I knew what the word gay meant and was aware that it applied to me as well; or:
>
> I had a good friend that I always wanted to spend time with in elementary school. Looking back I definitely had a crush on him; or:
>
> I was about 7 when I first had what I recognised as a "crush" on another boy, and then by 13 I'd associated this pattern of attraction with the word "gay".

A gay man noted:

> One of the most confusing things about being gay is feeling very close to a male friend and not knowing whether it is because you have a crush on him or you just really like him as a friend.

Lack of thrusting urge

The brain center responsible for regulating mounting (topping the female) and stimulating thrusting, in both sexes, is the Medial Preoptic Area (MPOA) in the hypothalamus. [52] Its damage, when associated with opposite sex hormone treatment, causes homosexual behavior in male laboratory animals. [53, 54] In one study, the MPOA was found to be on average smaller in homosexual men, and in another, trending for smaller. [55,56] Gay bottoms self-report of losing erection when in the top position and feeling awkward.

The MPOA is on average bigger, more dense in men than in women, due to androgens. This difference arises due to the gradual decrease of the MPOA size in women during childhood.

Male to Female transgenders report decreasing thrusting urges after starting female hormone therapy, like: “I haven't had any surgery, but since starting HRT …I don't really have a desire to "thrust" either, def not as much as I used to pre-HRT. I think it's been replaced by the desire to "grind" instead.”

The MPOA is activated by sexual arousal and the neurotransmitter dopamine. [57] Dopamine is crucial in the control of motor functions.

Men who have a low dopamine tone, a “tired” SNS, like after extended sexual activity, stimulant use etc. self-report becoming passive (“submissive”) in sexual encounters, not being motivated to be tops, instead preferring bottoming.

Another fact that points to the role of the SNS in sexual orientation is that early life adversity which overactivates the SNS is known to increase sexual drive, lower the age of first sexual attractions and increase homosexuality rates. [58]

Groinals in Homosexual Obsessive-Compulsive Disorder

A special case of homosexuality is homosexual HOCD. Persons with homosexual obsessive-compulsive disorder report quasi sexual arousal to same-sex persons without erection or with weak erection, which they call groinals. Research on what exactly is the groinal experience is scarce.

From the description of the experience, the arousal seems to be heavy in SNS activation effects like increased heart rate, heavy breathing, as well as increased attention, associated with faint pelvic arousal that is felt as warmth, tingles, without erection or with weak erection. For some, the groinals evolve to involve erection and become explicitly sexual leading to homosexuality, but for many they get chronic and remain egodystonic or recede with therapy. The groinals last longer than normal sexual arousal, happen frequently and often erratically in social contexts.

A description of groinals:

> If I see a decent looking man or a man doing something in a sexual manner I instantly get a groinal response. They are never erections my flaccid penis just becomes longer…It has gotten so bad that even when a man walks closely past me I get groinal responses.

There are even self-reports of coming near to or orgasming with groinals. Sufferers from HOCD self-report getting groinal responses under intense anxiety.

Some self-reports on the experience:

> So i tried to watch gay porn and I felt intense anxiety and something came out from my penis although I wasn't aroused. I think it was precum…; or:
>
> …if he touches me a little I get anxiety and a groinal, but then we did judo like our full bodies touching and I didn't feel anything, so it's so weird, but with girls if I do judo with them I get hard and its nice; or:
>
> With the gay porn I cum instantly even if nothing arouse me in the video…it's almost like the high level of stress I feel when I watch this makes me cum…? I never felt attraction to a guy in real life, it's only online that I test myself and after the orgasm I feel nothing like it's not when I orgasm to a girl…; or:
>
> But then, I was in the public transport and a guy stood in front of me, pretty close to me. My anxiety exploded, and I started to have a strong groinal response, much more strong than other times, I think I got a partial erection, I'm not sure how much…

Discussion

The effect of SNS on sexual orientation can explain the rapid changes that bisexuals, who make the majority of the LGBT identified persons, experience in sexual attractions. The effect of sexual hormones on sexuality is much slower to explain rapid shifts.

Bisexuals go through cycles of changing sexual attractions called bi cycles. The cycles can last days to years. It probably goes like this: bisexuals have heterosexual sex/fantasies, experience weaker and weaker erections due to the imbalance between SNS and the parasympathetic system. They cross over into homosexual sex/fantasies then stop engaging in sex due to satiety. Under abstinence, the sexual tension builds up, erection capacities return and with them heterosexual attractions return as well. The cycle repeats itself.

The bi cycles may happen in tandem with mood cycles or menstrual cycles.

An imbalance of the SNS is just one of the possible pathways leading to homosexuality. Sexual hormones, the immune system etc. also influence sexual behavior. How SNS interacts with sexual hormones to affect sexual behavior could be an interesting topic of further research.

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